

Department of Defense
Transportation Workshop
2004

HOT MIX ASPHALT
CONTRACTOR PANEL

March 29, 2004



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PURPOSE

- **IDENTIFY ADVERSE IMPACTS TO CONSTRUCTABILITY CREATED BY EXISTING COE SPECIFIED MATERIAL TEST PROCEDURES.**

KEY SPECIFICATIONS

- **Section 02300A Earthwork**
- **Section 02714A Drainage Layer**
- **Section 02722 Graded-Crushed Aggregate Base Course**
- **Section 02749 Hot-mix Asphalt for Airfields**

S:2300 Embankments & Testing

- **Material Gradation Tests (3.12.1)**
 - Tested for gradation at least once for every 30,000 SF of material placed.
- **In-Place Densities (3.12.2)**
 - Perform one moisture density relationship by ASTM D 1557, Method C at the same frequency as indicated for gradation tests.

S2300: Example

- **30,000 SF x 8 inch depth = 740 CY's / test sample.**
- **Bid based on placing 6,500 to 7,500 CY's / shift.**
- **7,000 CY's average shift ÷ 740 CY's test set = 10 test samples / shift.**

S 2300: Classified Material Testing

- **Material Gradation Tests:**
 - Processing, sieve analysis, hydrometer analysis, reporting = 2.5 MH's.
- **Moisture Density Relationship:**
 - Processing, testing, reporting = 5 MH's
- **Lab Test MH's / sample = 7.5 MH's**
- **Laboratory MH's / shift = 75 MH's**
- **Field tests, sampling, reporting = 10 MH's**
- **Total Lab and Field Test / shift = 85 MH's**

S2300: Material Placement

- **Classified Material Placement MH's**
 - **Place, grade and compact 7,000 CY / shift**
 - 4 Scrapers x 10 hrs = 40 MH
 - 1 Quad x 10 hrs = 10 MH
 - 1 Grader x 10 hrs = 10 MH
 - 2 Compactors x 10 hrs = 20 MH
 - 1 Water Truck x 10 hrs = 10 MH
 - 1 Grade Checker x 10 hrs = 10 MH
 - **Total MH's / 10 hr shift = 100 MH**

S2300: Constructability

- **Comparison of Testing to Placing.**
 - **Testing = 85 MH vs Placing = 100 MH**
 - Labor to perform testing is 85% of the labor required to place 7,000 CY's of material.
 - **Hydrometer and proctor test turnaround time will exceed the time to place 7,000 CY's of material by 24 to 36 hours.**
- **Hence, the lift will either be buried or production shut down pending test results.**

S2300: Summary

- **Testing needs to support production without compromising the Quality Control Process.**
- **AASHTO recommends one proctor test / 10,000 CY's**
- **State of Alaska construction manual test procedures allow one proctor / source.**

S:02714A Drainage Layer Testing

- **Initial Tests (1.7.4)**

- **One set of (aggregate) quality tests shall be performed on material prior to commencing construction to demonstrate proposed material meets requirements.**

- **Including Sieve Analysis (w/hydrometer), Flat & elongated particles, LA Abrasion and Soundness**

S:02714A Drainage Layer Testing

- **Testing Frequency(1.7.5.1)**
 - **Sieve analysis, Soundness, LA Abrasion, Fracture, Flat & elongated Particles tests shall be performed for each 10,000 SY produced.**

S2714A: Example

- **10,000 SY x 4 inch depth x 120 PCF = $\pm 1,800$ tons / test sample.**
- **Bid based on placing 3,000 tons / shift.**
- **3,000 tons shift \div $\pm 1,800$ tons test set = 2 test samples / shift.**

S2714A: Summary

- Specified gradation requires <5% passing #8 sieve, hydrometer is base on -#40 material.
- Initial tests include one Soundness and LA Abrasion test per source, industry standard.
- These two test are not typically used as acceptance tests.
- Soundness test requires a minimum of 8 days to perform.
- Repetition of these tests not required for GCAB or HMA aggregates.
- Material source is a government supplied designated pit adjacent to runway project.

S:2722 Graded Crushed Aggregate **Base Course**

- **Material Gradation Tests (1.4.3.2b)**
 - Tested for gradation at least once for every 4,000 SY of material placed.
- **Moisture Density Relationship (1.4.3.2c)**
 - Perform one by ASTM D 1557, Method C at the same frequency as indicated for gradation tests.

S2722: Summary

- Tested for gradation at least once for every 4,000 SY of material placed = $\pm 1,330$ tons / test set.
- 1/1,330 tons frequency is reasonable for gradation.
- 1,330 tons is not reasonable for proctor test.

S:02749 Hot-mix Asphalt

- **Material Acceptance and Percent Payment (3.11)**
 - A standard lot will be equal to 10,000 SY's of 2-inch thick asphalt concrete.
 - Lots divided into four equal sublots.
 - Bottom course will be evaluated for in-place density and laboratory air voids.
 - Surface course will be evaluated for in-place density, laboratory air voids, grade, smoothness and thickness.

S:02749 HMA Lots and Sublots

- Project standard lot size 10,000 SY's x 2 inches x 148 PCF = 1,110 tons
 - Sublots = 1,110 tons ÷ 4 = 278 tons
- FAA standard lot size = 2,000 tons
 - FAA sublot size = 400 tons
- FHWA standard lot size = 2,500 tons
 - FHWA sublot size = 500 tons

S:02749 Constructability

- COE lot size has been based on a day's production, divided into four equal sublots. It seemed to work well.
- Project sublots of 278 tons are excessive:
 - Production per shift as bid 3,000 tons ÷ 278 tons / subplot = 11 subplot test sets.
 - That means 11 cores/day on first passes and 22 cores/day on passes with longitudinal joint.

S:02749 HMA Summary

- **Project density core requirements as outlined represent destructive testing.**
- **The QC and QA laboratory will be consumed by the task of performing that volume of tests per subplot.**
- **Excessive testing may compromise the quality control process and test data will be outdated for real time use during production.**

Conclusion

- **The object and intent is to provide the owner with a quality product.**
 - **We need a sampling and testing frequency that is adequate, achievable and cost effective for the owner.**
- **Best value?**